



# The Advanced 27mm Aircraft Cannon for the Joint Strike Fighter

Presented By: Mark McMillan  
The Boeing Company  
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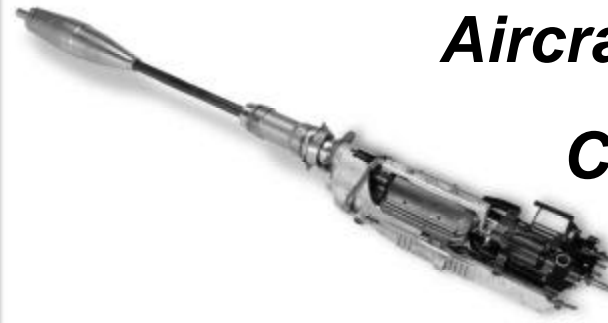
# ***Joint Strike Fighter***



**27mm**

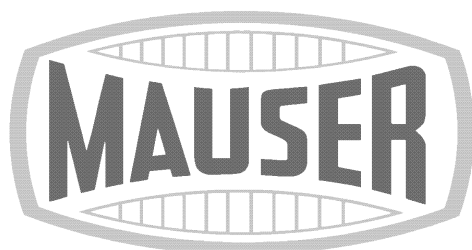
**Aircraft**

**Cannon**





## The Team



**WESTERN  
DESIGN**



**WESTERN  
DESIGN**





# ADVANCED 27mm AIRCRAFT CANNON FOR JSF



- The Advanced 27mm Cannon is a single barrel, gas operated revolver gun which fires 27mm X 145 ammunition at a rate of 1800spm. The gun system proposed for the JSF will utilize a linkless feed system with case recovery.





# Advanced 27mm Aircraft Cannon

## Technical Data



- Caliber 27mm x 145
- Method of Operation Gas Operated, Revolver Gun
- Feed System Linear Linkless Feed w/ Case Recovery System
- Weight:
  - Cradle / Breech Assy. 182.1 lb
  - Barrel 38.1 lb
  - Blast Bottle 19.8 lb
  - Elec. Re-Cock / Safety 7.0 lb
  - Total Gun Assy 247.0 lb
  - Recoil Damper 22.0 lb
- Rate of Fire 1,800 SPM
- Power Requirements 28Volts DC  
[2.75 amp for Primer]





# IN SERVICE



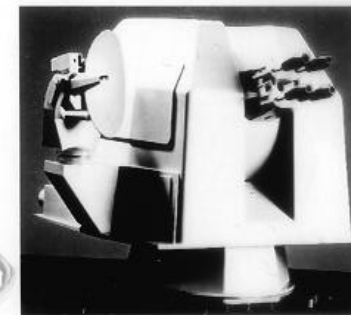
Tornado



Alpha Jet



JAS 39 Gripen



Drakon

BK 27  
Linked Version





# Linkless BK 27 For Eurofighter 2000 "Typhoon"





# ADVANCED 27mm AIRCRAFT CANNON FOR JSF



## SYSTEM ADVANTAGES

- **LOW WEIGHT & CUBE**
  - Reduces aircraft structural requirements
  - Reduces aircraft operation cost
- **LOW RECOIL**
  - Recoil Damper reduces aircraft structure requirements
  - Reduces avionics shock isolation systems
- **LOW ACOUSTIC SIGNATURE**
  - Blast bottle reduces blast tunnel structure requirements
  - Reduces mass flow impulse level
- **LETHAL**
  - 27mm
- **ACCURATE**
  - Single Barrel







# BK 27 LIFE CYCLE COST IMPROVEMENT PROGRAM

- Researched parts replacement records
  - Mauser factory recommendations
  - Existing user group data
    - Holloman AFB, NM - German Air Force Tactical Training Center
    - RAF Lossiemouth, Scotland - Royal Air Force Transition Training Facility
- Established part improvement priority based on part contribution to LCC and potential for improvements.





# BK 27 LIFE CYCLE COST IMPROVEMENT PROGRAM



- Focus is to improve Barrel Life
  - current “in service” barrel has broached rifling and no internal coating
  - review and optimize material, rifling, and coating options
  - recent Mk 44 testing has shown excellent results for chrome plated ECM rifling





# 27mm Barrel IRAD Plan

**10 Barrels are being manufactured to test for barrel life extension**

Coating Options	Quantity
No Coating	2
Nitride	2
Conventional Chrome	2
Sputter Coating	2

- 2 Spare Barrels held in reserve to pursue best/other options.
- Test Barrel is D6AC material with ECM rifling.
- Barrels will be test fired in Germany with Boeing involvement.
- Test data will be compared to existing data for 27mm barrels.





# 27mm Barrel IRAD Plan

## Material Options:

- Current “In Service” Barrel Material is defined by Mauser Spec.
- D6AC per AMS 6431 currently used on M230, M242, BMII Chain Gun Barrels.
- Compared to material for “in service” barrels D6AC is:
  - deeper hardening
  - does not exhibit temper embrittlement
  - retains higher strength at elevated temperatures
  - 50% greater Tensile/Yield Strengths





# 27mm Barrel IRAD Plan



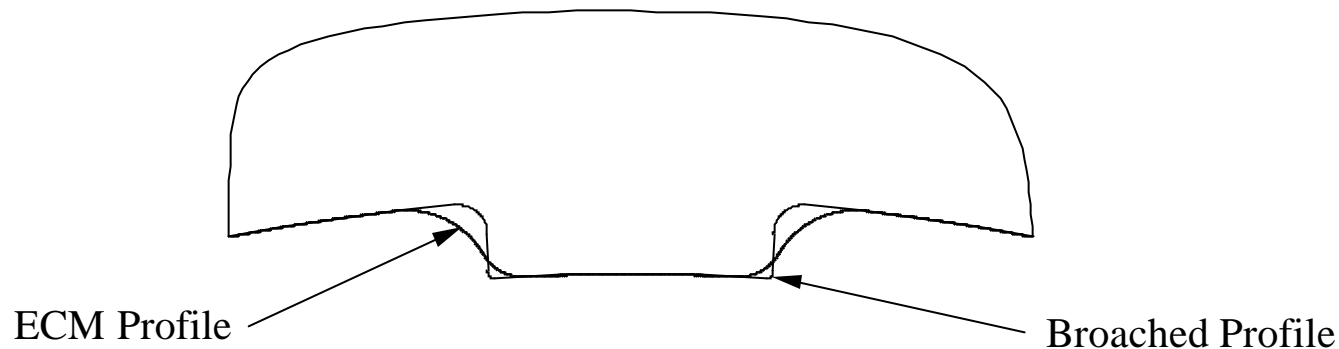
## Rifling Options:

- ECM Rifling results in a rifling profile that is more conducive to internal coatings.
- Broached rifling typically accomplished on base material with lower hardness ( $R_c < 35$ )





# ECM RIFLING PROFILE



- Provides natural fillet radius
- Provides natural external radius
  - Eliminates chipping of corners
- Provides smooth surface
  - Eliminates stress risers caused by tool chatter associated with broaching
- Capable of Machining on harder base material





# 27mm Barrel IRAD Plan



## Coating Options

- Current “In Service” barrel has no internal coating
- Nitride is currently used on M230, M242, and BMII Chain gun barrels
- Conventional Chrome has recently shown excellent results in Mk 44 (BMII) testing
- Sputter coating:
  - Developmental process with some associated risk
  - Several coating types are possible (Tantalum, Rhenium, Chrome)
  - Based on availability/cost Tantalum 10 Tungsten is coating choice for IRAD Program





# 27mm Barrel IRAD Plan



## Summary

- Increase barrel life by optimizing the material/rifling/coatings variables
  - Test all four coating configurations
  - Compare test data to existing barrel data
  - Determine Optimum Barrel Configuration for the Advanced 27mm Aircraft Cannon







# Advanced 27mm Aircraft Cannon for JSF



The Advanced 27mm Aircraft Cannon uniquely  
meets the challenging requirements of the  
Joint Strike Fighter Weapons System

